

IN THE CLAIMS

1. (currently amended) An Optical assembly ~~with comprising~~ a laterally graded reflective multilayer ~~(10,20)~~ ~~whose having~~ a reflecting surface ~~is to~~ reflect incident X-rays under low incidence angles while producing a two-dimensional optical effect, ~~characterized by the fact that~~ said reflecting surface ~~is comprised of~~ a single surface, ~~said reflecting surface being~~ conformed along two curvatures corresponding to two different directions.

2. (currently amended) The Optical assembly ~~of set forth~~ ~~in the preceding claim 1,~~ characterized in that ~~wherein~~ the laterally gradient-graded reflective multilayer extends along ~~the a~~ meridional direction of the incident X-rays.

3. (currently amended) The Optical assembly as claimed ~~in one of the preceding claims 1 or 2,~~ wherein ~~characterized in that~~ the reflecting surface is smooth.

4. (currently amended) The Optical assembly ~~as claimed~~ ~~in one of the preceding claims 1,~~ characterized in that ~~wherein~~ the two-dimensional optical effect is obtained by a single reflection of incident rays on the optical assembly.

5. (currently amended) The Optical assembly ~~as claimed~~ ~~in one of the preceding claims 1,~~ characterized in that ~~said wherein~~ the two different directions correspond respectively to ~~the sagittal direction~~ and ~~to the meridional directions~~ of the incident X-rays.

6. (currently amended) The Optical assembly as ~~claimed~~
~~in one of the preceding claims 1,~~ characterized in that wherein
the multilayer is a depth graded multilayer.

7. (currently amended) The Optical assembly as ~~claimed~~
~~in one of the preceding claims 1,~~ ~~characterized in that~~
~~said wherein the~~ reflecting surface is adapted to reflect rays of
Cu-K α peaks.

8. (currently amended) The Optical assembly as ~~claimed~~
~~in one of the preceding claims 1,~~ ~~wherein characterized in that~~
a first one of said two curvatures defines a circle.

9. (currently amended) The Optical assembly as ~~claimed~~
~~in any of claims 1, to 7 characterized in that wherein a first~~
one of said two curvatures defines a curve different from a
circle.

10. (currently amended) The Optical assembly as ~~claimed~~
~~in the preceding of claim 9,~~ ~~characterized in that a wherein the~~
~~first of said two curvatures~~ defines an ellipse or a parabola.

11. (currently amended) The Optical assembly as ~~claimed~~
~~in claims 1, to 7 characterized in that wherein a first one of~~
said two curvatures defines an open or a closed curve different
from a circle, an ellipse or a parabola.

12. (currently amended) The Optical assembly as ~~claimed~~
in any one of the ~~four preceding~~ claims 8, 9, 10 or 11,
~~wherein characterized in that the a~~ second one of said two
curvatures defines a circle.

13. (currently amended) The optical assembly as in any one of claims 8, 9, 10 or 11, ~~claimed in claims 1 to 11~~ ~~characterized in that~~ wherein ~~the~~ a second one of said two curvatures defines a curve different from a circle.

14. (currently amended) The optical assembly ~~of as claimed in the preceding claim 13,~~ ~~characterized in that~~ wherein the second ~~of said two~~ curvatures defines an ellipse or a parabola.

15. (currently amended) The optical assembly as in any one of claims 8, 9, 10 or 11, ~~as claimed in claims 1 to 11~~ ~~characterized in that~~ wherein ~~the~~ a second one of said two ~~of said two~~ curvatures defines an open or a closed curve different from a circle, an ellipse or a parabola.

16. (currently amended) The optical assembly ~~of as claimed in claims 1, to 7~~ ~~characterized in that~~ wherein the reflecting surface has a geometry of substantially toroidal shape.

17. (currently amended) The optical assembly ~~of as claimed in claims 1, to 7~~ ~~characterized in that~~ wherein the reflecting surface has a geometry of substantially paraboloidal shape.

18. (currently amended) The optical assembly ~~of as claimed in claims 1, to 7~~ ~~characterized in that~~ wherein the reflecting surface has a geometry of substantially ellipsoidal shape.

19. (currently amended) The optical assembly ~~of as claimed in claims 1, to 7~~ ~~characterized in that~~ wherein the reflecting surface has a ~~geometry~~ substantially circular geometry ~~in shape~~ along a first direction, ~~and~~ a substantially elliptic or parabolic geometry along a second direction.

20. (currently amended) ~~The~~ Optical assembly ~~as claimed~~
~~in one of the preceding claims 1, characterized in that~~ wherein
the reflecting surface has a sagittal curvature radius of less
than 20 mm.

21. (currently amended) ~~The~~ Optical assembly ~~as claimed~~
~~in one of the preceding claims 1, characterized in that~~
~~a further comprising at least one window that is opaque to X-~~
~~rays, and containing~~ the at least one window having an aperture
therein and being ~~is~~ associated with ~~at the an~~ input and/or an
output of the optical assembly, in order to control ~~the input~~
~~and/or output~~ a flux of the optical assembly.

22. (currently amended) ~~The~~ Optical assembly ~~as claimed~~
~~in the preceding of claim 21, wherein~~ characterized in that the
at least one windows are ~~is~~ removable.

23. (currently amended) ~~The~~ Optical assembly ~~as claimed~~
~~in one of the two preceding claims 21, wherein~~ characterized in
that the assembly comprises an aperture is located at ~~the an~~
input cross-section, and the size and the shape of said aperture
~~located at the input cross-section~~ can be adjusted in order to
control ~~the an~~ incident flux.

24. (currently amended) ~~The~~ Optical assembly ~~as claimed~~
~~in one of the three preceding claims 21, wherein~~ characterized
~~in that the assembly comprises an aperture is~~ located at ~~the an~~
output cross-section, and the size and the shape of said
aperture ~~located at the output cross-section~~ can be adjusted in
order to control ~~a the~~ reflected flux.

25. (currently amended) ~~The~~ Optical assembly as claimed
in one of claims 21 ~~or to~~ 22, ~~characterized in that~~ wherein the

apertures of the at least one windows ~~is~~are dimensioned ~~so as to~~ realize a flux/divergence compromise of ~~the~~ radiation.

26. (currently amended) A ~~Manufacturing~~ method of manufacturing an optical assembly comprising a laterally graded reflective multilayer having a reflecting surface to reflect incident X-rays under low incidence angles while producing a two-dimensional optical effect, said reflecting surface comprising a single surface conformed along two curvatures corresponding to two different directions, ~~as claimed in one of the preceding claims, characterized in that the method includes the comprising:~~

providing a substrate having a curvature along a first direction;

coating the substrate; and

curving the substrate along a second direction different than the first direction.

27. (currently amended) The ~~M~~method ~~as claimed in the preceding of claim 26, wherein characterized in that the first direction along which the substrate already has a curvature corresponds to the~~ a sagital direction of the optical assembly.

28. (currently amended) The ~~M~~method ~~as claimed in the preceding of claim 27, characterized in that said~~ wherein the curvature of the substrate ~~which correspondsing~~ to the sagital direction of the optical assembly defines a radius of curvature which is less than 20 mm.

29. (currently amended) The ~~M~~method as claimed in one of claims 27 or 28, wherein ~~the two preceding claims characterized in that the~~ second direction along which the substrate is curved

corresponds to ~~the~~ a meridional direction of the optical assembly.

30. (currently amended) ~~The Mmethod as claimed in one of the four preceding claims 26, characterized in that said~~wherein the substrate has a roughness lower than 10 rms.

31. (currently amended) ~~The Mmethod as claimed in one of the five preceding claims 26, characterized in that wherein providing the substrate itself is constituted, comprises starting from~~providing an element in the form of a tube, cone, or pseudo-cone already having a curvature along a direction orthogonal to the axis of the tube, of the cone or of the pseudo-cone.

32. (currently amended) ~~The Mmethod as claimed in the preceding of claim 31, wherein characterized in that the element is~~comprises a glass tube with~~having~~ a circular transversal cross-section.

33. (currently amended) ~~The Mmethod as claimed in the preceding of claim 32, characterized in that~~wherein the glass is of a borosilicate glass 3.3 type~~the Duran type (registered trademark)~~.

34. (currently amended) ~~The Mmethod as claimed in one of the two preceding claims 32, characterized in that the constitution of the substrate includes the~~further comprising cutting ~~of the glass tube along the~~a longitudinal direction ~~of the tube, in such a way as to obtain~~ so that the substrate has ~~a~~in the shape of an open cylinder.

35. (currently amended) ~~The Mmethod as claimed in the preceding of claim 34, further comprising, characterized in that~~

~~the cutting along the longitudinal direction of the tube is followed by cutting in order to dimension the optical assembly in length after cutting the glass tube along the longitudinal direction.~~

36. (currently amended) ~~The Mmethod as claimed in one of claim 26~~~~the ten preceding claims, characterized in that~~~~wherein the coating the substrate is performed in order to constitute~~achieve a multilayer before curving the substrate.

37. (currently amended) ~~The Mmethod as claimed in of claims 26, to 35, characterized in that~~~~wherein the substrate is curved in order to conform it to the~~a predetermined geometry sought before the coating it in order to constitute a multilayer~~step.~~

38. (currently amended) ~~The Mmethod as claimed in one of the twelve preceding claims 26, characterized in that~~~~further comprising coupling the optical assembly is coupled to a filter, in order to provide attenuation of the undesired spectral bands while guaranteeing sufficient transmission of a predetermined wavelength band for which reflecting the incident X-rays is sought.~~

39. (currently amended) ~~The Mmethod as claimed in the preceding of claim 38, characterized in that~~~~wherein the filter is comprises a 10-μm Nnickel filter.~~

40. (currently amended) ~~The Mmethod as claimed in one of the two preceding claims 38, characterized in that~~~~wherein the filter is fabricated~~realized by one of the following techniques:

~~— realization of two~~providing a pair of filters whose to obtain a combined thickness correspondings to thea predetermined filter thickness—sought, a first one of the pair

~~of filters positioned respectively on the~~ an input and output
~~windows and a second one of the pair of filters being positioned~~
~~on an output window of the radiation of a~~ protective housing
 containing the optical assembly; or

~~—depositing of a layer of filtering material on the~~
~~multilayer coating, the layer of filtering material having with a~~
 coating thickness ~~that is~~ approximately given by the following
 relationship:

$$d = (e \sin \theta) / 2,$$

wherein e is ~~the~~ a required filter "optical" thickness
 and θ ~~the~~ is an angle of incidence ~~on the optic~~.

41. (currently amended) A ~~D~~device for generating and
 conditioning X-rays ~~for applications for~~ angle-dispersive X-ray
 reflectometry, the device comprising: ~~including~~

an optical assembly as claimed in one of claims 1 to
25 comprising a laterally graded reflective multilayer having a
reflecting surface to reflect incident X-rays under low
incidence angles while producing a two-dimensional optical
effect, said reflecting surface comprising a single surface
conformed along two curvatures corresponding to two different
directions; and coupled to

a source of the incident X-rays coupled to the optical
assembly so in such a way that the incident X-rays emitted by the
~~source~~ are conditioned along two dimensions ~~so as to~~ adapt the
 beam emitted by the source in destination of a sample, with the
 X-rays having different angles of incidence on the sample ~~which~~
~~is considered.~~

42. (currently amended) The ~~D~~device ~~as claimed in the~~
~~preceding of~~ claim 41, wherein ~~characterized in that the~~
 dispersion of angle incidences on the sample corresponds

substantially to ~~the~~an angular dispersion along ~~the~~a sagital dimension of the beam reflected by the optical assembly.

43. (currently amended) ~~The~~ Ddevice as claimed in one of ~~the two preceding claims~~ 41 or 42, wherein ~~characterized in that~~ the optical assembly is directed ~~with relative regard~~ to the sample ~~in such a way~~so that the normal in ~~the~~a center region of the optical assembly is approximately parallel to the surface of the sample.

44. (currently amended) ~~The~~ Ddevice ~~as claimed in one of the three preceding claims~~ 41, characterized in thatwherein a capture angle at ~~the~~a level of the sample is greater than 2° along a first dimension corresponding to ~~the~~a sagital dimension of the optical assembly and about 1° along a second dimension corresponding to ~~the~~a meridional dimension of the optical assembly, the optical assembly being positioned ~~in such a way that~~ ~~these~~so dispersion in angles of incidence of the X-rays on the sample is greater than 2° , the sample being positioned at least ~~a distance greater than 15 cm in relation to~~from the optical assembly.